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SUMMER NOTES ON THE MOUNTAIN VEGETATION OF HAYWOOD COUNTY, NORTH CAROLINA

BY ROLAND M. HARPER

In July and August, 1908, it was my privilege to spend a few weeks at the Biltmore Forest School, in the mountains of North Carolina, by invitation of the Director, Dr. C. A. Schenck. This school is located during the summer months in the "Pink Beds", a beautiful valley in the northern corner of Transylvania County, with its floor elevated about 3,200 to 3,300 feet above the sea. The Pisgah Ridge, with its crest varying in altitude from about 4,500 to 6,000 feet, forms the northwestern boundary of this valley and the southeastern boundary of Haywood County.

The Pink Beds valley seems to be unique in several respects, and considerably more field work would be necessary before one could do justice to its very interesting vegetation and ecological problems. But the mountains of Haywood County seem to be thoroughly typical of western North Carolina, and much of what follows will doubtless apply almost as well to any other county in the neighborhood.

While sojourning with Dr. Schenck I ascended to the crest of the Pisgah Ridge several times, and walked once over to Waynesville (the county-seat of Haywood County, distant 16 miles from the Pink Beds "as the crow flies" and nearly half as far again by the roads) and back. On the way over to Waynesville I followed the East Fork of Pigeon River most of the way, leaving it at its confluence with the West Fork and going thence nearly due west the remaining seven or eight miles. On the way back I went up the West Fork a few miles, then turned eastward and

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went over the summit of Cold Mountain, a sharp peak between the two forks, whose altitude is given by Buckley * as 6,105 feet, and on the topographic maps of the United States Geological Survey as between 6,000 and 6,100 feet. From Waynesville I also walked the railroad to Balsam, about eight miles southwestward and just over the line in Jackson County. This is about 3,300 feet above sea level, and is said to be the highest railroad station east of the Rocky Mountains.

Although a great deal of botanical work has been done in these far-famed North Carolina mountains ever since they were visited by Bartram and Michaux in the latter part of the 18th century, it has been mostly mere collecting, and the publications resulting from it, with very few exceptions, have been either works relating to trees only, notes on selected species, or narratives dealing with the flora or scenery rather than with the vegetation. So perhaps an attempt to classify the habitats of a small but typical portion of the mountain region, and arrange the species in each according to structure, relative abundance, etc., will not involve too much duplication of previous publications. Although the time I spent in Haywood County was very short, and I collected no specimens (so that some of my identifications are incomplete or uncertain), some of the generalizations which follow may be just as true as if they were based on a broader foundation, and some comparisons with other regions may be of interest.

As is well known to geographers, the mountains of North Carolina are as near normal as any in North America, having been brought to their present form almost entirely by erosion, with few or no complications due to faulting, unequal hardness of strata, glaciation, solution (*e. g.*, of limestone), volcanic action, etc. The topographic forms are consequently comparatively simple, consisting chiefly of ridges and valleys, most of them sloping equally on both sides and running in every possible direction, the former with sharp crests undulating but scarcely serrate, and the latter steep, rocky, and V-shaped toward their heads and broader, smoother, and more level lower down. There are no caves, sinks, natural lakes, islands, or cut-offs, and

* Am. Jour. Sci. II. 27 : 287. 1859.

comparatively few precipices and waterfalls. These mountains are much less rocky than the glaciated ones of the North, for in the countless ages that they have been exposed to the weather all but the hardest and steepest rocks have become deeply buried in soil resulting from their own decay.

The following descriptions of vegetation are intended to apply only to areas more than 2,700 feet above sea-level. Below this rather arbitrary limit in Haywood County the country is scarcely mountainous, consisting mostly of broad valleys and low hills with fertile red soil, very largely under cultivation, and the vegetation does not differ greatly from that of the Piedmont region of the Carolinas and Georgia.

Above the altitude just mentioned the principal habitats in this county seem to be (1) mountain summits above 5,500 feet, (2) slopes and lower summits below 5,500 feet, (3) wet ravines or mountain rivulets, (4) rich ravines or steep coves, (5) river banks and bottoms, (6) gravelly and muddy river beds, (7) wet meadows, and (8) artificial or unnatural habitats.

In the following lists the species are divided into trees, shrubs and herbs, and then arranged as nearly as possible in order of abundance. Evergreens, when known, are indicated by heavy type, and vines by italics.* To make the lists more complete and determine the relative abundance of the species more accurately than would have been the case if I had adhered closely to political boundaries, I have included in my calculations notes made about a mile over the Jackson County line near Balsam, and along the crest of the Pisgah Ridge, where I was sometimes a few yards over the Transylvania County line. This will not introduce any perceptible error into the results.

The only mountain above 5,500 feet which I set foot on is Cold Mountain, already mentioned. The Balsam Mountains, a few miles farther west, are about 500 feet higher, and more densely wooded, but I did not have a chance to visit them, and little is known about the details of their vegetation. During about an hour spent on and near the sharp summit of Cold

* For explanation of a more elaborate method of treating habitat-groups see Ann. N. Y. Acad. Sci. 17: 36-41. 1906.

Mountain late in the afternoon of August 9 the following native species were noted. (This summit, like many others in the same region, has long been used for pasturage,* and there are of course a good many weeds on it. These will be found in the last list.)

TREES

Crataegus sp.
Fagus grandifolia
Abies Fraseri (1) †
Sorbus americana (2)
Betula lutea
Quercus rubra
Betula alleghaniensis?

SHRUBS

Rhododendron catawbiense (3)
Vaccinium sp.
Pieris floribunda
Cholisma ligustrina
Kalmia latifolia
Rhododendron punctatum
Salix humilis
Menziesia pilosa (4)

HERBS

Eupatorium ageratoides
Pteris aquilina
Danthonia sp.
Deschampsia flexuosa (5)
Heuchera villosa
Houstonia serpyllifolia (6)
Potentilla tridentata (7)
Houstonia longifolia
Lysimachia quadrifolia
Silene virginica
Hypericum Buckleyi
Polypodium vulgare
Epigaea repens
Selaginella rupestris
Habenaria ciliaris
Carex trisperma
Asplenium Filix-foemina
Circaea alpina (8)
Lilium superbum

It happens that on the same afternoon Dr. H. D. House was on the summit of Mt. Pisgah, on the edge of the same county, about six miles farther east and 300 feet lower, where he found many of the same species, and *Paronychia argyrocoma* besides. Quite a number of the same have been reported from similar habitats a little farther north by Dr. Harshberger.†

* See Gray, Am. Jour. Sci. 42: 41, 47. 1842; Redfield, Bull. Torrey Club 6: 338. 1879; Scribner, Bot. Gaz. 14: 255. 1889.

† Interesting notes on the species whose names are followed by numbers can be found as follows: (1) Gray, Am. Jour. Sci. 42: 31, 42. 1842; Redfield, Bull. Torrey Club 6: 338. 1879; Sargent, Gard. & For. 2: 472. f. 132. 1889; Pinchot & Ashe, Bull. N. C. Geol. Surv. 6: 136, 223. 1898; (2) Gray, l. c. 28, 42. (3) Redfield & Gray, Bull. Torrey Club 6: 336. 1879; Small & Heller, Mem. Torrey Club 3¹: 4. 1892; Cannon, Torrey 2: 161-169. 1902; (4) Gray, Am. Jour. Sci. 42: 42. 1842; Small & Heller, l. c. (5) Scribner, Bot. Gaz. 14: 254. 1889. (6) Gray, l. c. 19, 40; Redfield, l. c. 337; F. E. Boynton, Pop. Sci. Mo. 31: 654. 1887. (7) Gray, l. c. 27, 41; L. N. Johnson, Bot. Gaz. 13: 270. 1888; Small & Heller, l. c. 14. (8) Harshberger, Bot. Gaz. 36: 378. 1903.

‡ Bot. Gaz. 36: 376-382. 1903.

The trees here, as in many other exposed places in different parts of the world, are very stunted, none over ten feet tall having been noticed, and they are mostly so scattered as to afford little shade. The *Crataegus* and *Fagus* together formed little groves or thickets on the northern slope near the summit, and curiously enough, could hardly be told apart at a little distance. The bark of both was smooth and gray, their leaves were of about the same size and color, and the *Crataegus* (apparently of the *coccinea* group) had ripe red fruit, about the same size as the involucre of the *Fagus*, which were also reddish-tinged.

The balsam, *Abies Fraseri*, seemed to be confined to north slopes too. It was not common on Cold Mountain, but considerable quantities of it were plainly visible on another peak of about the same height a few miles to the southward; and the Balsam Mountains are said to be covered with it, whence their name.

The herbs were scarcely stunted at all, doubtless because the larger ones are not evergreen, and thus escape the chilling blasts of winter. On the very highest point was a specimen of *Lilium superbum* about four feet tall, rearing its flowers above all other vegetation on the mountain.

The proportion of evergreens seems rather small for such an exposed habitat. Vines seem to be entirely absent, which however is not surprising. All but one of the shrubs belong to the Ericaceae.

About 20 per cent. of the species in the foregoing list are peculiar to the Appalachian region, south of the limits of glaciation, and the remainder are pretty widely distributed in the northeastern states. About one-fourth of the widely distributed species also extend as far south as Florida.

On the mountain slopes and lesser summits, from about 3,300 to 5,000 feet above sea-level, the flora is considerably richer, chiefly because this habitat is the most widespread and variable one in the region under consideration. The following species were noted in such situations in Haywood County or within a mile of its borders between the middle of July and the middle of August:

TREES

Castanea dentata
 Acer rubrum
 Quercus coccinea
 " rubra
 " Prinus
 Halesia carolina
Tsuga canadensis
 Robinia Pseudo-Acacia
 Betula lutea
 " lenta?
 Acer pennsylvanicum
 " Saccharum?
 Picea australis?
 Fagus grandifolia
 Acer spicatum

SHRUBS

Kalmia latifolia
Rhododendron maximum
 Chollisma ligustrina
 Vaccinium sp.
 (same as on Cold Mt.)
 Menziesia pilosa
 Gaylussacia resinosa
 Leucothoë recurva
 Clethra acuminata
 Azalea viscosa
 Hamamelis virginiana
 Hydrangea arborescens
 Aronia nigra
 Azalea viscosa glauca
 Vaccinium corymbosum
 Azalea lutea
 Polycodium sp.
 Sassafrastr variifolium
 Corylus rostrata
 Ceanothus americanus
 Robinia hispida
 Comptonia peregrina

HERBS

Pteris aquilina
 Dasystoma laevigata
 Coreopsis major Oemleri *
 Koellia montana †
 Dennstaedtia punctilobula
 Cimicifuga racemosa
Galax aphylla
 Zizia Bebbii
 Stenanthium gramineum
 Phlox glaberrima?
 Campanula divaricata
 Nabalus sp.
Epigaea repens
 Habenaria ciliaris
 Melampyrum americanum
 Silene stellata
 Osmunda cinnamomea
 Collinsonia canadensis
 Lysimachia quadrifolia
 Veratrum parviflorum ‡
 Pedicularis canadensis
 Dryopteris noveboracensis
 Viola rotundifolia
 Houstonia purpurea
 Monotropa uniflora
Selaginella rupestris (on rocks)
Deschampsia flexuosa " "
Polypodium vulgare " "
 Heuchera villosa " "
 Chrosperma muscaetoxicum
 Monarda clinopodia?
 Aster divaricatus?
Polystichum acrostichoides
Dioscorea villosa
 Houstonia longifolia
 Silene virginica
 Solidago caesia
 Potentilla canadensis
 Aletris farinosa
 Porteranthus trifoliatus
 Viola affinis §
 Iris verna
 Eupatorium purpureum?
 " ageratoides
 Lilium superbum
 Erigeron pulchellus
 Angelica villosa
 Seriocarpus asteroides
 Andropogon furcatus
 Ligusticum canadense
 Actaea alba
 Chrysopsis Mariana
 Angelica atropurpurea
 Hieracium paniculatum
 Caulophyllum thalictroides

* See Gray, Am. Jour. Sci. 42 : 46. 1842.

† See Gray, Am. Jour. Sci. 42 : 43, 47. ‡ See Gray, Am. Jour. Sci. 42 : 26.

§ Identified by Dr. House, who accompanied me on some of my walks along the Pisgah Ridge.

In this habitat, or group of habitats, the trees overshadow all the other vegetation, except on the very summits of the ridges, but they hardly make the dense shade characteristic of a climax forest. Some of the herbs have thickened or reduced leaves, and are capable of flourishing in perfectly treeless habitats, while others are distinctly shade-loving, having thin and broad leaves. The scarcity of pines, other evergreens, and vines is noteworthy.*

About two thirds of the shrubs and two or three of the herbs belong to the Ericaceae and allied families. Compositae, Umbelliferae, and Melanthaceae are also pretty well represented. Only about 12 per cent. of the angiosperms are monocotyledons.

Between 15 and 20 per cent. of the species seem to have their centers of distribution right in these mountains, though none are confined to North Carolina. Many of the remainder are common on bluffs in all the southeastern states, and still more are widely distributed in various habitats in the northeastern states. A large proportion of them have been reported from the mountains of New York by Dr. Harshberger.†

The wet rocky ravines at the heads of streams have a characteristic and interesting but not very rich flora. This habitat seems to be much better developed in the Pink Beds than in the parts of Haywood County that I visited, where I found only the following species in it :

SHRUBS
Rhododendron maximum

HERBS
Houstonia serpyllifolia
Chelone Cuthbertii ?
Impatiens biflora
Chelone glabra
Diphylleia cymosa ‡
Osmunda cinnamomea
Thalictrum clavatum ‡
Carex gracillima ?
Aconitum uncinatum ?

* This type of forest corresponds with a part of Ashe's "forests of the highe mountains" (Bull. N. C. Geol. Surv. 6 : 219-222. *pl.* 23. 1898), and more exactly with the "chestnut slope type" described by F. W. Reed in the vicinity of Grandfather Mountain (Bull. U. S. Bureau Forestry 60 : 12-13. *pl.* 3. 1905).

† *Torreya* 5 : 187-194 ; *Plant World* 8 : 276-281. 1905.

‡ See Gray, *Am. Jour. Sci.* 42 : 23. 1842 ; Redfield, *Bull. Torrey Club* 6 : 338, 339. 1879.

§ See Gray, *l. c.* 17 ; Redfield, *l. c.* 338 ; Small & Heller, *Mem. Torrey Club* 3¹ : 7. 1892.

About half of these are typical southern Appalachian species. The remainder range farther north.

Some small ravines or steep coves are so filled with deep rich humus or colluvial soil that no water appears above ground in them in ordinary weather. Such places have a decidedly climax vegetation, comprising the following species :

TREES	HERBS
<i>Tilia americana</i>	<i>Eupatorium ageratoides</i>
<i>Halesia carolina</i>	<i>Cimicifuga racemosa</i>
<i>Castanea dentata</i>	<i>Dryopteris noveboracensis</i>
<i>Robinia Pseudo-Acacia</i>	<i>Phegopteris hexagonoptera</i>
<i>Aesculus octandra</i>	<i>Astilbe biternata</i> *
<i>Cornus florida</i>	<i>Caulophyllum thalictroides</i>
<i>Tsuga canadensis</i>	<i>Osmunda Claytoniana</i>
<i>Acer rubrum</i>	<i>Sanguinaria canadensis</i>
<i>Liriodendron Tulipifera</i>	<i>Adiantum pedatum</i>
<i>Nyssa sylvatica</i>	<i>Dioscorea villosa</i>
<i>Hicoria alba</i>	<i>Disporum</i> sp.
<i>Fagus grandifolia</i>	<i>Phryma Leptostachya</i>
	<i>Circaea lutetiana</i>
	<i>Meibomia nudiflora</i>
	<i>Eupatorium trifoliatum</i> ?
	<i>Arisaema triphyllum</i>
	<i>Lappula virginiana</i>
	<i>Scutellaria</i> sp.
	<i>Koellia montana</i>
	<i>Agrimonia</i> sp.
	<i>Cynoglossum virginianum</i>
	<i>Falcata comosa</i>
	<i>Aster divaricatus</i> ?
	<i>Adicea pumila</i>
	<i>Cypripedium parviflorum</i> ?
	<i>Collinsonia canadensis</i>
	<i>Cypripedium acaule</i>
	<i>Osmunda cinnamomea</i>
	<i>Dryopteris intermedia</i> ?
	<i>Trillium undulatum</i> ?
	<i>Botrychium virginianum</i>
	<i>Thalictrum dioicum</i> ?
	<i>Geranium maculatum</i>
	<i>Aristolochia Serpentaria</i>
	<i>Campanula americana</i>
	<i>Urticastrum divaricatum</i>

In this list there is only one evergreen, and that is not abundant. The scarcity of shrubs is rather surprising, but perhaps not very significant. Plants with biternate, pinnately compound, or otherwise much dissected leaves are numerous. (*Cimicifuga*, *Astilbe*, *Caulophyllum*, *Thalictrum*, and the seven ferns are good

* See Gray, Am. Jour. Sci. 42 : 37-38. 1842.

examples.) Half the trees have wind-borne seeds, but among the herbs a large proportion have berries or burs, adapted to be carried off by animals, as is the case in many climax forests.

About 15 per cent. of the angiosperms are monocotyledons. The total absence of the Ericaceae and their allies is significant. The polypetalous families are well represented here, as in many other parts of the north temperate zone where climax vegetation prevails (the Tennessee valley of Alabama for instance).

Only about 10 per cent. of these species can be regarded as typical or characteristic mountain plants. Most of them are common to all parts of temperate eastern North America where there are climax forests. There is an especially striking resemblance between this list and that for certain shaded hillsides in the Paleozoic region of Georgia, and even the valleys at the heads of some of the bays on the northwestern shore of Long Island, particularly that of Little Neck Bay just within the limits of New York City, which I had examined about a month before I went to North Carolina. The majority of those listed here occur in somewhat similar habitats in southeastern Pennsylvania, according to Dr. Harshberger,* and nearly half extend to Southwest Georgia † and the corresponding parts of Alabama.

On the banks of the two forks of Pigeon River already mentioned, between 2,700 and 3,300 feet above sea-level, the following species were noticed :

TREES

Fagus grandifolia
Halesia carolina
Quercus imbricaria
Quercus alba
Tsuga canadensis
Acer rubrum
Carpinus caroliniana
Aesculus octandra
Pyrus coronaria
Crataegus sp. ‡
Tilia heterophylla ?
Robinia Pseudo-Acacia

SHRUBS

Rhododendron maximum
Alnus rugosa
Leucothoe Catesbaei
Kalmia latifolia
Vitis aestivalis ?
Hamamelis virginiana
Rhus radicans
Ceanothus americanus
Lonicera sp.
Pyrularia pubera §

* See Bull. Torrey Club 31 : 143-148. 1904.

† See Bull. Torrey Club 31 : 15-16. 1904.

‡ Probably of the *coccinea* group. Fruit ripe August 7, 3-seeded.

§ See Gray Am. Jour. Sci. 17 : 22. 1842.

TREES (continued)

Cornus florida
Platanus occidentalis
Magnolia acuminata
Castanea dentata
Quercus velutina?
Acer Saccharum?
Juglans nigra
Fraxinus sp.
Prunus serotina

HERBS

Dryopteris noveboracensis
Epiphegus virginiana
Cimicifuga racemosa
Polygonum virginianum
Podophyllum peltatum
Meibomia nudiflora
Phryma Leptostachya
Geum canadense
Clematis virginiana

Here the trees outnumber the shrubs and herbs, and there are more vines than in any other habitat in the region. This preponderance of trees and vines seems to be characteristic of river banks and alluvial swamps in many other parts of the world.* Rivers as a rule are bordered by vegetation approaching the climax, but at this altitude of 3,000 feet there is still so much erosion going on that the normal succession is retarded, which probably accounts for the abundance of four evergreens.

Few if any of the species in this list can be considered as peculiarly Appalachian. Nearly all of them are common in the Piedmont region from Pennsylvania to Alabama, as well as in the Mississippi valley; and several are still more widely distributed.

In the gravelly and muddy beds of the same streams, which must be covered with water half the time, the following herbs find a congenial habitat:

Polygonum sagittatum
Impatiens biflora
Juncus effusus
Hypericum mutilum
Eupatorium perfoliatum

Rhynchospora glomerata
Carex lurida
Scirpus polyphyllus
Lobelia cardinalis
Mimulus ringens

The fact that four of these, or 40 per cent., are monocotyledons, is probably not without significance. All of them are pretty widely distributed, mostly northward.

Near Davis Gap (sometimes called Pigeon Gap), about three miles east of Waynesville, and near Balsam Gap, about seven miles southwest, are the only wet meadows which I made note of in the region under consideration. Both are about 3,300 feet

*See Ann. N. Y. Acad. Sci. 17: 67-73, 103-104. 1906.

above sea-level. The cause of the treelessness of such areas, and their relations to other habitats in the neighborhood, are unsolved — though perhaps not very difficult — problems. With the exception of *Acer rubrum* and *Salix longipes*, scattered along stream channels at Balsam Gap, the vegetation is entirely herbaceous, as follows :

Eupatorium perfoliatum	Osmunda regalis
Vernonia noveboracensis	Hypericum mutilum
Panicularia nervata	Helenium autumnale
Homalocenchrus virginicus	Oxypolis rigidior
Juncus effusus	Cyperus strigosus
Eryngium virgatum	Mimulus ringens
Scirpus sylvaticus	Galium trifidum ?
Rhynchospora glomerata	Apios tuberosa
Carex lurida	Carex crinita
Linum striatum	Juncus canadensis ?
Polygonum sagittatum	Gerardia purpurea ?
Osmunda cinnamomea	Habenaria ciliaris

All of these are just as common outside of the mountains as they are here, if not more so. Most of them can be found in wet meadows in New England, and a still larger proportion along the head-waters of East Meadow Brook, near Hempstead, Long Island ; and all range at least as far south as Middle Georgia, about 100 miles farther south and 2,500 feet lower.

All the species seem to be perennial, but none are evergreen in the ordinary sense of the word. Nearly half the angiosperms are monocotyledons. There are no Ericaceae among them.

The weeds of the mountain region are found principally along trails and roads and in pastures and abandoned fields. They are all or nearly all herbs, and mostly dicotyledons. The following list is doubtless very incomplete. The species are arranged approximately in order of abundance, as usual.

Juncus tenuis *	Chrysanthemum Leucanthemum
Prunella vulgaris	Achillea Millefolium
Potentilla canadensis	Veronica officinalis *
Rumex Acetosella	Polygonum Hydropiper
Lobelia inflata	Trifolium repens
Verbascum Thapsus	Oxalis stricta ?

* See Gray, Am. Jour. Sci. 42 : 41. 1842.

<i>Verbena urticaefolia</i>	<i>Lepidium virginicum</i>
<i>Carduus lanceolatus</i>	<i>Polygonum aviculare</i>
<i>Polygonum pennsylvanicum</i>	<i>Bidens bipinnata</i>
<i>Fragaria virginiana</i>	<i>Lespedeza striata</i> †
<i>Pteris aquilina</i>	<i>Euphorbia corollata</i>
<i>Plantago major</i>	<i>Anthemis Cotula</i>
<i>Solanum carolinense</i>	<i>Euphorbia maculata</i>
<i>Diodia teres</i>	<i>Erechthites hieracifolia</i>
<i>Cerastium vulgatum</i> ?	<i>Leptilon canadense</i>
<i>Agrimonia</i> sp.	<i>Trifolium pratense</i>
<i>Hedeoma pulegioides</i>	<i>Gnaphalium purpureum</i>
<i>Potentilla monspeliensis</i>	<i>Acalypha gracilens</i>
<i>Erigeron ramosus</i>	<i>Oenothera biennis</i>
<i>Daucus Carota</i>	<i>Gnaphalium polycephalum</i>
<i>Ambrosia artemisiifolia</i>	<i>Euphorbia Preslii</i>
<i>Plantago lanceolata</i>	

Of these weeds about 28 per cent. are supposed to have been introduced from Europe and 2 per cent. from Asia, while the remaining 70 per cent. are considered indigenous by nearly all systematists. And yet all the supposed natives, with five or six exceptions, are confined to unnatural habitats, exactly like the introduced species, from which there is no possible way of distinguishing them without the use of botanical literature, such as a manual, and even that is not infallible. At least half, perhaps two thirds, of the species in the above list evidently belong to that class of native weeds (mutants ?) which I discussed just before going to North Carolina.‡

COLLEGE POINT, NEW YORK

MAGNOLIA AT FLORISSANT §

By T. D. A. COCKERELL

The Miocene flora of Florissant, Colorado, includes so many genera living today in the southeastern states, that the apparent absence of *Magnolia* has seemed remarkable. During the past summer, however, a leaf which may I think be referred to this

* See Gray, Am. Jour. Sci. 42 : 27. 1842.

† See Gattinger, Fl. Tenn., 107. 1901.

‡ Bull. Torrey Club 35 : 347-360. July, 1908.

§ Illustrated with the aid of the Catherine McManes fund.